Economic Brief

Implications of Risks and Rewards in College Decisions

By Kartik Athreya and David A. Price

Despite a large and growing earnings premium for college graduates, growth in college enrollment and especially college attainment in the United States has been quite slow. The labor market's apparent lack of responsiveness to the earnings premium may be driven in part by risks that marginally prepared students face when they go to college. Failing or dropping out could leave them with low wealth, high debt, and low earnings. Recent research indicates that neither further increases in the earnings premium nor reductions in costs are likely to produce large increases in the college completion rate. And if technological change continues to increase the demand for skilled labor, both the earnings premium and income inequality will continue to grow.

Completion of a college degree generates, on average, a large and growing wage premium. In one longitudinal analysis, people who completed college earned, over their lifetimes, more than twice as much as those who did not.[1] The college premium increased substantially from the late 1970s onward; workers with bachelor's degrees received 1.4 times the wages of high-school-only graduates in 1980, a multiple that climbed to 1.75 by 2005.[2] Even taking into account the rising costs of higher education, investing in a bachelor's degree remains highly lucrative for most college-ready students.

The growth of the college premium has given rise to an economic puzzle: In view of the substantial payoff to higher education, why have college enrollment and completion rates been growing so slowly? Although college enrollment is high, approximately one-third of students who complete high school either delay college or never go, and the share of people who complete four-year de-grees by the age of 25 has increased over the past two decades by a mere four percentage points. In short, the response of the supply side of the labor market to changes in the college premium has been surprisingly weak. Recent research by Richmond Fed economist Kartik Athreya and Northwestern University economist Janice Eberly seeks to pinpoint the extent to which various factors are deterring students from investing in college.[3]

At the center of Athreya's and Eberly's analysis is the role of risk in a student's decision-making.[4] Studies looking at the rate of return on a college investment commonly address the value of a successfully completed college education. Such an approach disregards the significant uncertainties that a student must consider at the threshold of his college decision: What is the probability that he will fail academically? And even if the student earns a degree, what is the probability that the high *average* payoff from a degree will not be realized in his particular case? Moreover, because

college programs are normally two or four years in length, the student may consider these questions anew when deciding whether to return to school for each new semester.

Athreya and Eberly argue that both "failure risk" and "rate-of-return risk" are important determinants of an individual's actual return from a college investment. Around half of students who begin college do not complete it, and the return to attending college without earning a degree appears to be low.[5] For many students, college is a costly investment. It entails years of foregone earnings. Finally, a wide range of empirical work in economics suggests that even after completion, there is risk of a disappointing payoff from college. Wages and earnings seem to have significant heterogeneity.[6] These risks arise from the possibility that college graduates may suffer long-lasting shocks to employment opportunities from, say, changes in the structure of the economy that render certain occupations less valuable. In the current context, an additional risk is that college premia may shrink, as they have done at times in the past.[7]

Lastly, for many students, college is a highly leveraged investment.[8] Moreover, unlike a financial or physical asset, it cannot be resold, and the loans often used to finance a college degree—U.S. government-guaranteed student loans—are not dischargeable in bankruptcy.[9] Hence, students who fail or drop out face a triple threat to their financial futures—low wealth, high debt, and low earnings.

To estimate the extent to which risk and other factors influence enrollment decisions, Athreya and Eberly construct a model to predict the flow of new college enrollees on the basis of education costs, resources available to pay those costs, the expected college premium, the risk of failure, and the risk to subsequent earnings. They base education costs on College Board estimates of tuition at all public two-year and four-year institutions of higher education. They focus on public colleges because some 75 percent of students attend those institutions and because public colleges normally are a feasible option for students who choose private institutions (while the reverse often would not be true). Pricing at private colleges

is also more opaque given their greater tendency toward price discrimination in the form of high sticker prices combined with individualized financial aid packages.

With regard to available resources, the literature indicates that family savings are typically minimal; indeed, one study finds that among families saving for college, only 25 percent of those with high school seniors had set aside more than $10,000.[10] Athreya and Eberly assume a distribution of family resources with a median of $3,000.[11] In addition, in view of federal loan-guarantee programs, they assume that students are able to borrow the full cost of college if they wish, since this falls within the parameters of the loan programs. For the college premium, the researchers assume a path for earnings that would approximate the premium prevailing from 1993 through 2005—that is, a multiple of 1.75 for those who received their bachelor's degrees compared to those who only earned high school diplomas, and 1.2 for those who completed some college.

In assessing failure risk, the researchers note that students and their families estimate the risk of not completing college on the basis of numerous factors, "including prominently a combination of family background, high school performance, and standardized test scores." In the researchers' model, the proxy for failure risk—or, put differently, the level of preparation for college—is academic achievement tests given to high school students as part of longitudinal studies that began in 1972 and 1988.[12]

In assessing rate-of-return risks, specifically to the wages households will earn, the authors employ estimates of risk that take account of differences in educational attainment as well as differences in the way both taxes and public social insurance systems affect people of different educational levels.[13]

Athreya and Eberly find that any further increase in the college premium—within reasonable bounds—is unlikely to motivate a large number of additional students to attend college. Figure 1 shows the model's implications across a wide range of multipliers for the college premium.[14]

Among the one-third of high school graduates who do not immediately go on to college, and among those who now attend, few are on the fence. The reason that increases in the college premium lead to a minimal number of additional enrollments and completions appears to arise from the fact that enrollment does not automatically lead to reaping the benefit of the premium. The risk of failure seems to influence both the decision whether to enroll and the decision whether to drop out. In effect, a higher college premium improves the expected return for the well-prepared students, who were already likely to attend, but not for poorly prepared students, who were not likely to attend. As a result, increases in the premium do not change the decisions of many students. Moreover, even though the researchers' model does not place constraints on borrowing, a student's wealth and preparedness appear to substitute for one another in the decision whether to enroll. For those who are well-prepared, family financial resources do not greatly affect that decision, but as the level of preparation declines, the importance of family

resources becomes greater in light of the risk of failure. Reductions in the cost of college—such as those resulting from subsidies—correspondingly matter primarily for the poorly prepared, and so again may not substantially change the overall rate of college completion. This finding suggests, consistent with a growing body of evidence, that resources aimed at earlier ages (pre-K and K-12) are more likely to yield benefits than any modest increase in the level of aid to college enrollees.

These results also have implications for the future of earnings inequality in the face of any technological changes that favor skilled workers and increase the college premium. Because college enrollment and especially completion may not respond strongly to such changes, the premium may continue to rise and remain persistently high. As a result, all else equal, income inequality arising from the gap in earnings between those able to take advantage of the college premium and those unable to do so will continue to grow. ■

Figure 1: As the College Premium Increases, the Model Predicts that More Students Would Enroll but a Lower Percentage Would Graduate
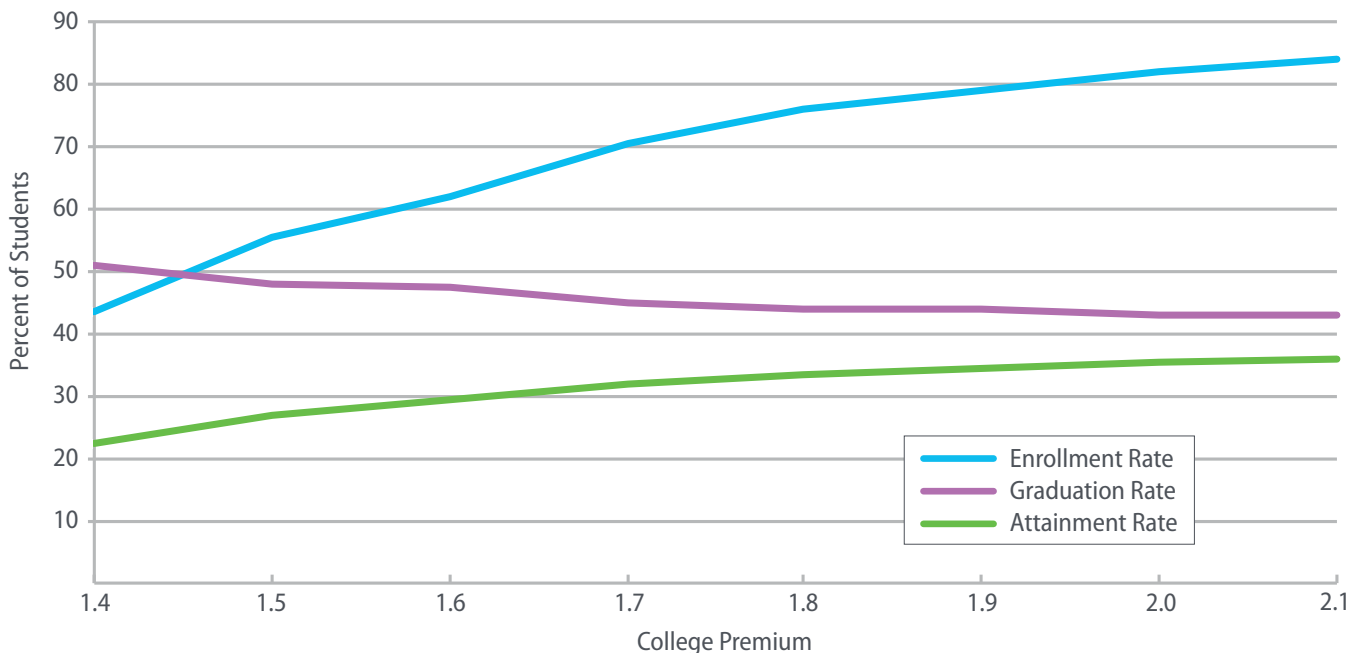
Note: The college premium is the average lifetime earnings of four-year-college graduates expressed as a multiple of the average lifetime earnings of high-school-only graduates. The enrollment rate is the percent of high school graduates who enroll in two-year or four-year colleges. The graduation rate is the percent of those enrollees who earn bachelor's degrees. The attainment rate is the percent of all high school graduates who earn bachelor's degrees (the enrollment rate multiplied by the graduation rate).

Source: Athreya and Eberly (2013)

Kartik Athreya is group vice president for micro-economics and research communications in the Research Department of the Federal Reserve Bank of Richmond, and David A. Price is senior editor of the Bank's economics magazine, *Econ Focus*.

Endnotes

[1] This calculation is based on the present values of lifetime earnings using a sample of 33- to 48-year-old workers from the Panel Study of Income Dynamics. See Restuccia, Diego, and Carlos Urrutia, "Intergenerational Persistence of Earnings: The Role of Early and College Education," *American Economic Review*, December 2004, vol. 94, no. 5, pp. 1354–1378.

[2] See Archibald, Robert B., and David H. Feldman, *Why Does College Cost So Much?* New York: Oxford University Press, 2011, p. 55.

[3] See Athreya, Kartik, and Janice Eberly, "The Supply of College-Educated Workers: The Roles of College Premia, College Costs, and Risk," Federal Reserve Bank of Richmond Working Paper No. 13-02, March 5, 2013.

[4] Earlier work that has examined the role of risk in college decision-making includes Altonji, Joseph G., "The Demand for and Return to Education When Education Outcomes Are Uncertain," *Journal of Labor Economics*, January 1993, vol. 11, no. 1, pp. 48–74; Elizabeth M. Caucutt and Krishna B. Kumar, "Higher Education Subsidies and Heterogeneity: A Dynamic Analysis," *Journal of Economic Dynamics and Control*, 2003, vol. 27, pp. 1459–1502; and Chatterjee, Satyajit, and Felicia Ionescu, "Insuring Student Loans Against the Financial Risk of Failing to Complete College," *Quantitative Economics*, November 2012, vol. 3, no. 3, pp. 393–420.

[5] See Athreya and Eberly, p. 5.

[6] For example, see Guvenen, Fatih, "Macroeconomics with Heterogeneity: A Practical Guide," Federal Reserve Bank of Richmond *Economic Quarterly*, Third Quarter 2011, vol. 97, no. 3, pp. 255–326.

[7] See Goldin, Claudia, and Lawrence F. Katz, *The Race Between Education and Technology*, Cambridge, Mass.: Harvard University Press, 2008.

[8] For more on student debt burdens, see Lee, Donghoon, "Household Debt and Credit: Student Debt," Federal Reserve Bank of New York, Presentation, February 28, 2013.

[9] The feature of non-dischargeability should be associated with lower interest rates on these loans since they are not collateralized. Also, income-based repayment programs reduce the effect of non-dischargeability and provide more risk-sharing.

[10] See Table 13 of Kane, Thomas J., "College-Going and Inequality: A Literature Review," Russell Sage Foundation Working Paper, June 30, 2001.

[11] The true resources available to an enrollee are not directly observable because they depend on the willingness of parents and others to make transfers to the student. Researchers have used data that attempts to track the actual "within-lifetime" (as opposed to bequest) transfers. See, for example, Abbott, Brant, Giovanni Gallipoli, Costas Meghir, and Giovanni L. Violante, "Education Policy and Intergenerational Transfers in Equilibrium," NBER Working Paper No. 18782, February 2013. Athreya and Eberly seek to remain conservative in estimating resources, as higher numbers would ensure, once the remainder of their model is "calibrated" to match current enrollment rates, that even more households would be insensitive to the college premium.

[12] The tests were given during the National Longitudinal Study of the High School Class of 1972 and the National Educational Longitudinal Study of 1988. See Bound, John, Michael F. Lovenheim, and Sarah Turner, "Why Have College Completion Rates Declined? An Analysis of Changing Student Preparation and Collegiate Resources," *American Economic Journal: Applied Economics*, July 2010, vol. 2, no. 3, pp. 129–157. Family wealth, which correlates with test scores, still will vary across households and generally matter above and beyond any effect on test scores. Athreya and Eberly account for this in their model by distributing failure risk such that the model's enrollment rates by test score, when averaged across all wealth levels of households within a given test-score quartile, match those in the data.

[13] Hubbard, R. Glenn, Jonathan Skinner, Stephen P. Zeldes, "Precautionary Saving and Social Insurance," *Journal of Political Economy*, April 1995, vol. 103, no. 2 pp. 360–399.

[14] It is important to note that the model aims to study enrollment on the basis of a premium that is known by the student to be fixed over his or her lifetime. In reality, college premia have changed over shorter periods. As a result, the model does not allow for a direct comparison with a given historical moment when a particular college premium prevailed.

FEDERAL RESERVE BANK OF RICHMOND®

Richmond ▪ Baltimore ▪ Charlotte